Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183
	)	
	)	

REPLY COMMENTS OF
SOUTHERN COMPANY SERVICES, INC.

Southern Company Services, Inc. ("Southern"), on behalf of itself and its operating affiliates, hereby submits its reply comments on certain of the issues raised in the *Notice of Inquiry*, FCC 17-104 ("*NOI*"), in the above-captioned matter. Southern joins the comments of many other parties who have expressed serious concerns about the impact to point-to-point microwave systems used to support the nation's Critical Infrastructure if mobile services are allocated to Fixed Service bands, whether on a licensed or an unlicensed basis. Although a number of parties express support for mobile services in the 5.925-6.425 GHz and 6.425-7.125 GHz bands (together the "6 GHz" band), the proponents fail to offer much certainty that these bands can be shared without harmful interference to incumbent microwave systems.

A number of parties noted that new services, such as licensed or unlicensed mobile services, would pose serious interference threats to incumbent Fixed Service operations.[1] The 6 GHz band is ideal for long-haul transmissions for critical infrastructure communications and public safety.

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[1] Comments of APCO International at iii; Duke Energy at 3-4; Los Angeles County, CA, *et al*. at 4-5; Lower Colorado River Authority at 4-5; Tucson Electric Power Company ("TEP") at 5-7; and Utilities Technology Council and Edison Electric Institute at 7-8 and 11-12.

In its Comments, Southern expressed concern that long-term sharing of the 6 GHz band, without a prior coordination process, would not be viable. The National Spectrum Managers Association ("NSMA"), representing individuals involved in spectrum management across a number of industry sectors, succinctly described the problem of introducing mobile services into a Fixed Service band: interference mechanisms from other stationary licensed users are well understood in the design process, but very low levels of interference will degrade the fade margin of a path over time and will not be obvious during normal operation.[2] "The introduction of mobile or other technology transmitters into mission critical networks without a trusted method of frequency management is troubling."[3]

The Fixed Wireless Communications Coalition ("FWCC") offered a persuasive analysis of how even very low power (10 milliwatt) unlicensed transmitters could interfere with fixed microwave systems at distances ranging from a few feet to several miles in front of the microwave receive antenna.[4] FWCC also demonstrated how unlicensed devices operating at the maximum power levels allowed for Wi-Fi could cause interference to fixed microwave receivers up to 110 miles away.[5] Similarly, the National Public Safety Telecommunications Council ("PSTC") noted that a low power device, even if restricted to operating indoors, could cause interference to 6 GHz microwave if operated in a high-rise building.[6] Engineers with United States Cellular Corporation ("USSC") believe that opening the 6 GHz band to unlicensed devices

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[2] NSMA at 6.

[3] NSMA at 7.

[4] FWCC at 9-11.

[5] FWCC at 11.

[6] NPSTC at 7.

could raise interference thresholds on its microwave links and thereby reduce the levels of reliability that USCC designs into its system, to the detriment of its customers and the public generally.[7]

By contrast, commenters in favor of opening the 6 GHz band to mobile devices offer little to nothing in the way of engineering support for their conclusory opinions that unlicensed devices can be deployed without interference to Fixed Service incumbents, or for their belief that licensed mobile, or flexible-use, services could be authorized at 6 GHz. In lieu of offering engineering solutions supported by technical analysis, these commenters merely list concepts that have been suggested or adopted in other bands – but without explaining how they would prevent interference to the tens of thousands of licensed point-to-point microwave paths at 6 GHz; many of which are used to support public safety and critical infrastructure and therefore need the highest levels of reliability.

Commenters expressing support for unlicensed operations at 6 GHz raise theories on how incumbent systems could be protected, but offer very little, to no, technical explanation of how these techniques would be applied in practice or how they would definitively protect all incumbent and future microwave systems:

- Wi-Fi devices operate at low power and generally indoors, while point-to-point microwave systems operate at higher power, outdoors and with highly directional antennas.[8] *However, it is not explained how operation could restricted to indoor use, or how indoor operation will, in every instance, protect fixed microwave, or how such interference would be identified and mitigated without substantial effort by the incumbent licensee*.

- Allow unlicensed devices to operate under a database-driven system, or a Spectrum Access System, that would authorize use after computing potential interference to fixed

[7] USSC at 4.

[8] All Points Broadband, *et al.* at 11; Broadcom Ltd. At 11; Dynamic Spectrum Alliance at 14-15.

links in the area.[9] *However, there is very little real-world experience with systems such as this, and in bands that are heavily used for communications that support public safety and the nation's critical infrastructure, with little margin for disruption. Moreover, such operations still place the practical burden on incumbent licensees to identify and report interference, with very little assurance that future instances of interference can or will be prevented.*

- Use a cognitive radio technology, like Dynamic Frequency Selection ("DFS") in the 5 GHz U-NII bands.[10] *However, it is not clear whether unlicensed mobile devices can adequately identify and protect fixed microwave transmissions under all circumstances. In addition, identification of interfering unlicensed devices would be virtually impossible for incumbent microwave licensees. Experience has also shown that such devices are not always operated as required.*[11]

Other commenters support the introduction of new technologies at 6 GHz provided they cause no interference to incumbents, but these commenters offer no solutions to the universally-conceded problem of opening 6 GHz to new technologies.[12] This indicates that a great deal of technical analysis and testing is required before there can be a realistic proposal to expand use of 6 GHz beyond Fixed Services.

A few commenters support introduction of licensed mobile services at 6 GHz, but there is also recognition that licensed mobile operations would require a plan to relocate the tens of thousands of microwave paths from this band, and with great uncertainty as to how many could even be accommodated in higher bands.[13] As pointed out by Southern and other parties, there are

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[9] Google, at 15; Motorola Solutions at 3-4

[10] Wireless Broadband Alliance at 17.

[11] See *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order in ET Docket No. 13-49, 29 FCC Rcd 4127 (2014).

[12] Ericsson at 9; Verizon at 21-22.

[13] T-Mobile at 17-19 (allocate part of the 6 GHz band for licensed and the other part for unlicensed, and require auction winners to relocate incumbents); Ericsson at 10 (converting 6 GHz to licensed flexible use would have to be accompanied by opening additional bands for high capacity point-to-point links to meet the growing need for backhaul); Wireless Broadband

no bands to which tens of thousands of 6 GHz paths could be relocated and that would allow the same level of path reliability without significant investment in additional infrastructure.[14] As also noted by the Dynamic Spectrum Alliance, auctioning underlay licenses at 6 GHz would not be successful because the band is densely licensed in urban areas, and the coordination contour for a single microwave path can extend 200 miles from the transmitting end and 125 miles in radius around the transmitter.[15]

Conclusion

Comments on the NOI confirm that there are significant technical hurdles to introducing unlicensed devices or flexible-use licensed services in the 5.925 – 7.125 GHz band. As the Commission noted in the NOI, and as also confirmed in the comments, the tens of thousands of fixed service links in this band support a variety of critical services such as regulation of electric grids, control of natural gas and oil pipelines, public safety, coordination of railroad train movements, and backhaul for commercial wireless traffic.[16] Commenters supporting expanded access to the 6 GHz band have offered little to nothing in the way of technical analysis on how these critical systems would be assured of interference-free operation.

Alliance at 14 (with over 100,000 licensed links in the band, a relocation process would be "contentious, expensive, uncertain and lengthy"); Mid-Band Spectrum Coalition at 14(coalition members are divided on whether 6 GHz can be used for licensed services or not).

[14] FWCC at 13; Tucson Electric Power at 9-10.

[15] Dynamic Spectrum Alliance at 20.

[16] *NOI*, paras. 25 and 35.

WHEREFORE, THE PREMISES CONSIDERED, Southern Company Services, Inc. respectfully requests that the Commission take action in this docket consistent with the views expressed herein.

Respectfully submitted,

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